

CLAIMS

2 What is claimed is:

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4 1. An adsorption apparatus for treatment of wastewater comprising, in
5 combination:

6 an inlet for the wastewater connected to a metals trap which adsorbs metals;

7 and

8 a second trap which filters organic materials from the wastewater, positioned
9 between the inlet and the metals trap, wherein the second trap at least partially
10 comprises one of a phosphate and activated carbon.

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12 2. The adsorption apparatus of claim 1 further comprising a pH controller,
13 adjusting the pH of the wastewater to a predetermined range.

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15 3. The adsorption apparatus of claim 2 wherein the predetermined range is pH
16 5.5-7.5.

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18 4. The adsorption apparatus of claim 1 further comprising a first trap positioned
19 between the inlet and the second trap which filters solids from the wastewater of
20 greater than a predetermined size.

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22 5. The adsorption apparatus of claim 4 wherein the predetermined size is about
23 5 microns.

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2 6. The adsorption apparatus of claim 4 wherein the first trap comprises at least
3 one of silica sand, charcoal, and coal.

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5 7. The adsorption apparatus of claim 1 wherein the second trap comprises
6 calcium phosphate.

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8 8. The adsorption apparatus of claim 1 wherein the second trap contains bone
9 char.

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11 9. The adsorption apparatus of claim 8 wherein the second trap contains fish
12 bone char.

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14 10. The adsorption apparatus of claim 1 further comprising activated carbon in at
15 least one of the second trap and the metals trap.

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17 11. The adsorption apparatus of claim 1 wherein the metals trap comprises a
18 metal oxyhydroxide.

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20 12. The adsorption apparatus of claim 1 further comprising an additional oxidizer
21 incorporated as part of at least one of the metals trap and the second trap.

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1 13. A method of adsorption and removal of impurities from wastewater
2 comprising, in combination the steps of:
3 restricting a size of the impurities to less than a predetermined size by
4 passing the wastewater through a first chamber containing a solids trap; and
5 passing the wastewater through a second chamber after passage through the
6 first chamber, the second chamber containing a second trap for organic materials
7 comprising a phosphate.

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9 14. The method of claim 13 further comprising the steps of:
10 adjusting a pH and a temperature of the wastewater prior to introduction of
11 the wastewater to the first chamber.

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13 15. The method of claim 13 further comprising the step of:
14 passing the wastewater through a third chamber containing a third trap for
15 adsorption of metals;
16 wherein the second trap comprises bone char and the third trap comprises
17 metal oxyhydroxide.

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19 16. The method of claim 15 wherein each chamber is adapted for backwashing,
20 permitting wastewater to be flushed out of each chamber separately.

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22 17. A method of manufacturing fish bone char comprising, in combination, the
23 steps of:

1 removing fat and oily residues from fish bone and fish parts;
2 heating the fish bone and fish parts in a reduced oxygen environment to a
3 temperature of 500-900°C for 5 to 30 hours, producing fish bone char; and
4 processing the fish bone char to a desired mesh size.

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6 18. The method of manufacturing fish bone char of claim 17 wherein the step of
7 removing fat and oily residues comprises one of rendering and boiling the fish bone
8 and fish parts.

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10 19. The method of manufacturing fish bone char of claim 17 wherein the fish
11 bone char is processed to a mesh size of 4 to 400 mesh.

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13 20. The method of manufacturing fish bone char of claim 19 wherein the fish
14 bone char is processed to a mesh size of 4 to 30 mesh.